

Image visualization and quantitative analysis of void structures in sediments and rocks

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In order to characterize the detailed pore structures of sedimentary rocks, the following techniques have been employed: (1) visual image analysis under an optical microscope of the pore space (10-0.01 mm scale) filled with colored epoxy resin, (2) visual image analysis of micro-pore space (0.01 mm - 100 nm scale) using atomic force microscope (AFM), (3) nondestructive imaging technique using X-ray computerized tomography (CT-Scan). The heterogeneity of pore structures was quantitatively determined, and its relation to transport properties (diffusivity, permeability) will be discussed.

Fluid flow property in soils, sediments and rocks is important for prevention of the groundwater contamination by industrial and radioactive wastes. It is suggested that the property of fluid flow, in particular advection, in the porous media is strongly affected by the pore structure. In order to characterize the detailed pore structures of sedimentary rocks, the following techniques have been employed: (1) visual image analysis under an optical microscope of the pore space (10-0.01 mm scale) filled with colored epoxy resin, (2) visual image analysis of micro-pore space (0.01 mm - 100 nm scale) using atomic force microscope (AFM), (3) nondestructive imaging technique using X-ray computerized tomography (CT-Scan). The heterogeneity of pore structures was quantitatively determined, and its relation to transport properties (diffusivity, permeability) will be discussed.